	Universitas Negeri Surabaya Faculty of Mathematics and Natural Sciences Biology Undergraduate Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Microbiology	4620103127		T=3	P=0	ECTS=4.77	2	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	.....	.....	Dr. H. Sunu Kuntjoro, S.Si., M.Si.

Learning model: Case Studies

Program Learning Outcomes (PLO)

PLO study program that is charged to the course

PLO-5	Able to communicate scientific ideas, both orally and in writing using appropriate communication media according to the target, as a means of lifelong learning for academic self-development.
PLO-7	Able to work independently and collaboratively, as well as responsibly, in completing various tasks in class, in the laboratory and in the field.
PLO-9	Able to work independently in the laboratory and develop relevant skills by applying bioethics and work safety
PLO-13	Able to demonstrate basic knowledge of cell and molecular biology, organismal biology, ecology and evolution to analyze current biological issues

Program Objectives (PO)

PLO-PO Matrix

P.O	PLO-5	PLO-7	PLO-9	PLO-13

PO Matrix at the end of each learning stage (Sub-PO)

P.O	Week															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Short Course Description: Study the scope and development of microbiology, basics of microbial chemistry, laboratory techniques, microbial classification, cell structure of prokaryotes (bacteria and blue algae) and eukaryotes (fungi and protozoa), viruses, structure and function of microorganisms including: control, nutrition and cultivation, metabolism and its regulation, growth and reproduction, genetics, microbial applications in the fields of health, industry, food and the environment. This course is presented in theoretical and practical form.

References

Main :

1. Asri, M.T., Trimulyono, G. dan Lisdiana, L. 2011. Petunjuk Praktikum Mikrobiologi Dasar dan Terapan . Surabaya: University Press Unesa.
2. Atlas, R.M. 1996. Principles of Microbiology . USA: Wm. C. Brown Publisher.
3. Cano, R.J. and Colome, J.S. 1986. Microbiology . New York: Westing Publishing Company.
4. Ibrahim, M. 2008. Mikrobiologi: Prinsip dan Aplikasi . Surabaya: University Press.
5. Pelczar, M.J. Jr. dan Chan. E.C.S. 1986. Dasar-dasar Mikrobiologi (diterjemahkan oleh: Ratna Siri, H. dkk). Jakarta: Penerbit UI Press.
6. Wheller, M. F. dan Weskef, A. V. 1990. Mikrobiologi Dasar (diterjemahkan oleh: Soenartono. A). Jakarta: Penerbit Erlangga.

Supporters:

Supporting lecturer: Prof. Dr. Mahanani Tri Asri, M.Si.
Guntur Trimulyono, S.Si., M.Sc.
Lisa Lisdiana, S.Si., M.Si., Ph.D.
Farah Aisyah Nafidiastri, S.Si., M.Si.

Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)
		Indicator	Criteria & Form	Offline (*offline*)	Online (*online*)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

1	Understand the development of microbiology	1. Explain the history of the development of microbiology 2. Identify the position of microbes in the scheme of life 3. Explain the evolution of microorganisms 4. Explain the function of microbiology lab equipment	**Criteria:** 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS weight 20% 3. Students' activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay questions are assessed together at USS 6. Multiple choice questions are assessed jointly on the US 7. Performance questions are integrated during learning	Presentation, discussion Practical work 3 X 50			0%
2	Understand the basics of microbial chemistry	1. Identify reasons for studying microbial chemistry 2. Explain the concept of chemistry and chemical bonds 3. Identify the role of water and solutions regarding microbes 4. Identify the structure and function of complex organic molecules 5. Skilled in performing sterilization	**Criteria:** 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS weight 20% 3. Students' activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay questions are assessed together at USS 6. Multiple choice questions are assessed jointly on the US 7. Performance questions are integrated during learning	Presentation, Discussion and reflection 3 X 50			0%
3	Understanding Laboratory Techniques	1. Explain the development of the microscope 2. Explain the principles of a microscope 3. Identify various types of microscopes 4. Skillfully apply techniques in microbiology practice	**Criteria:** 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS weight 20% 3. Students' activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay questions are assessed together at USS 6. Multiple choice questions are assessed jointly on the US 7. Performance questions are integrated during learning	Presentation, discussion, demonstration and practice 3 X 50			0%

4	Grouping microorganisms into certain taxa according to the description of their characteristics	1. Explain the principles of microbial classification 2. Determine the characteristics of certain microbes 3. Skilled in making mixed cultures 4. Skilled in making pure cultures 5. Skilled in painting microbes	**Criteria:** 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS weight 20% 3. Students' activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay questions are assessed together at USS 6. Multiple choice questions are assessed jointly on the US 7. Performance questions are integrated during learning	Presentation, discussion and practice 3 X 50			0%
5	Distinguish between prokaryotic and eukaryotic cell structures	Compare the structure of prokaryotic and eukaryotic cells	**Criteria:** 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS weight 20% 3. Students' activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay questions are assessed together at USS 6. Multiple choice questions are assessed jointly on the US 7. Performance questions are integrated during learning	Presentation, discussion and reflection 3 X 50			0%
6	Understand the nutrients needed by microbes and be able to culture them in the laboratory.	1. Identify types of microbes based on their nutrition 2. Determine the type of microbial culture media 3. Skilled in making microbial growth media	**Criteria:** 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS weight 20% 3. Students' activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay questions are assessed together at USS 6. Multiple choice questions are assessed jointly on the US 7. Performance questions are integrated during learning	Presentation and discussion 3 X 50			0%

7	Understand the growth and reproduction of microorganisms	1. Identify growth phases 2. Identify ways to measure microbial growth 3. Identify types of culture	**Criteria:** 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS weight 20% 3. Students' activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay questions are assessed together at USS 6. Multiple choice questions are assessed jointly on the US 7. Performance questions are integrated during learning	Presentation and discussion 3 X 50			0%
8			**Criteria:** US weight 30%	3 X 50			0%
9	Understand the process of controlling microorganisms	1. Explain the meaning and principles of controlling microorganisms 2. Identify examples of physical and chemical microbial control	**Criteria:** 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS weight 20% 3. Students' activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay questions are assessed together at USS 6. Multiple choice questions are assessed jointly on the US 7. Performance questions are integrated during learning	Presentation and discussion 3 X 50			0%

10	Understand metabolic processes in microorganisms	Explain the meaning of metabolism	**Criteria:** 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS weight 20% 3. Students' activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay questions are assessed together at USS 6. Multiple choice questions are assessed jointly on the US 7. Performance questions are integrated during learning	Presentation and discussion 3 X 50			0%
11	Understand metabolic processes in microorganisms	1. Sequencing metabolic stages in microbes 2. Explain the process of biosynthesis	**Criteria:** 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS weight 20% 3. Students' activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay questions are assessed together at USS 6. Multiple choice questions are assessed jointly on the US 7. Performance questions are integrated during learning	Presentation and discussion 3 X 50			0%
12	Understand the principles of microorganism genetics and metabolic regulation	1. Explain the meaning of genetics, genes, and chromosomes 2. Compare the structures of DNA and RNA 3. Explain the central concept of dogma 4. Explain the concept of transferring genetic material	**Criteria:** 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS weight 20% 3. Students' activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay questions are assessed together at USS 6. Multiple choice questions are assessed jointly on the US 7. Performance questions are integrated during learning	Presentation and discussion 3 X 50			0%

13	Understand the principles of microorganism genetics and metabolic regulation	1. Explain the meaning of operons, structural genes, and control genes 2. Explain the mechanism of control by operons 3. Explain the feedback control mechanism 4. Mention the stages of metabolic control	**Criteria:** 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS weight 20% 3. Students' activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay questions are assessed together at USS 6. Multiple choice questions are assessed jointly on the US 7. Performance questions are integrated during learning	Presentation, discussion and reflection 3 X 50			0%
14	Describe the general characteristics of viruses and the process of viral infection in the host	1. Determine the role of viruses in human life 2. Identify the characteristics of viruses 3. Group viruses 4. Explain the reproductive cycle of viruses 5. Skilled in cultivating viruses Skilled in making preparations for observing virus specimens	**Criteria:** 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS weight 20% 3. Students' activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay questions are assessed together at USS 6. Multiple choice questions are assessed jointly on the US 7. Performance questions are integrated during learning	Presentation and discussion and practice 3 X 50			0%

15	Understand the principles of Applied Microbiology	1. Explain the applied forms of microbiology concepts in various areas of life 2. Skilled in making products applying microbiology concepts	**Criteria:** 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS weight 20% 3. Students' activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay questions are assessed together at USS 6. Multiple choice questions are assessed jointly on the US 7. Performance questions are integrated during learning	Presentation, discussion 3 X 50			0%
16			**Criteria:** 1. Practical reports and products are assessed as ASSIGNMENTS with a weight of 30% 2. USS weight 20% 3. Students' activities and responses during learning activities, especially practicums, are assessed as participation, with a weight of 20% 4. US weight 30% 5. Essay questions are assessed together at USS 6. Multiple choice questions are assessed jointly on the US 7. Performance questions are integrated during learning	3 X 50			0%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
		0%

Notes

1. **Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
2. **The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
5. **Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
6. **Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
7. **Forms of assessment:** test and non-test.

8. **Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
9. **Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.